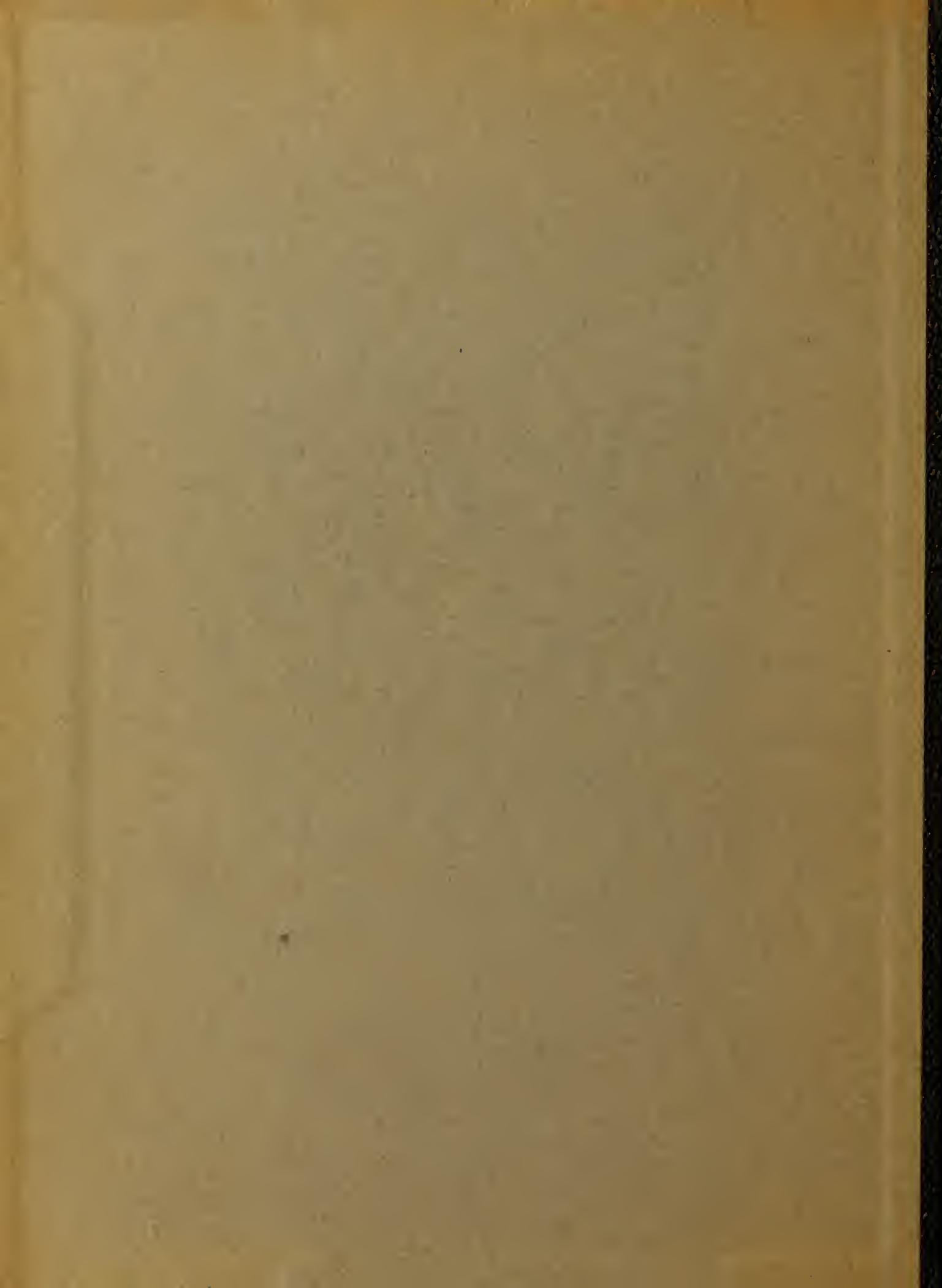


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Thesis  
THE PLAY OF ANIMALS

by

Ethel Nye Caldwell  
(A.B., Boston University, 1927)

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APPROVED

by

First Reader *G. Z. Plutsky*  
Professor of

Second Reader *Stuart K. Harris*  
Professor of



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## INTRODUCTION

The fact that animals play is known to both laymen and biologists. Although the play of young dogs, cats, monkeys, and bears is frequently observed, the play of spiders and the playful antics of birds at mating time are rarely noticed. As far as the invertebrates are concerned, there is no evidence of play below the arthropods. In the higher forms we find that there is a greater amount of time spent in play and that it has a greater influence upon these animals in their successful struggle for existence.

As we shall see later, most writers believe that play is instinctive, but many of them disagree as to the purpose and usefulness of play. The three best-known theories regarding the purpose of play are those of Schiller, Spencer, and Groos, the last-named author having written a fundamental treatise on the subject.

It is the object of this thesis to give a detailed survey of the material on the subject of animal play and to show the need for further observations of animals in their play in order to throw more light on the significance of animal play.



## THEORIES OF PLAY

By studying play one finds a most profitable way of studying mankind itself. According to Gulick (1920, pp. xi and xiii), play consists of that which people do when they have food, shelter, and clothing, are rested and free from worry, when the physical compulsions of life are removed temporarily and the spirit is free to search for its own satisfaction. Why should this not be true also of animals?

Gulick (1920, pp. 99 and 108) further states that by play is meant those actions that are done instinctively with no immediate purpose. Different individuals show great contrasts in their play life. This difference relates to the vigor with which they play, the amount of time they spend in play, and the quickness with which they imitate others. This contrast is also noticed among animals. In the case of the dog and cat, the dog is more imitative than the cat. This is believed to be due to the fact that the dog, when grown, hunts in packs. The dog is a social animal while the cat is unsocial and even anti-social. This difference appears first in their play life.

Play to the grown person signifies something to be postponed until the more serious pursuits have been accomplished. In the case of children and young animals, play is an important thing. Play among young animals is first in interest and represents real life. Lee (1916, p. xiii) maintains that the play instinct "is not toward a physical satisfaction nor toward the avoidance of pain; it is an instinct toward an ideal."





The fact that animals play has been noted by many writers. Spencer (1888) and Schiller (1901) both entertain the same theory as to the cause, known as the surplus energy theory. Whether these two authors came to their conclusion separately or whether Spencer was influenced by Schiller is not known. Spencer (1888, p. 626) in his *Principles of Psychology* mentions a quotation from a German author who is now known to have been Schiller.

Surplus vigor is often a condition favoring a manifestation of play. Here the surplus vigor finds vent, where there is no serious occasion for its existence. Schiller (1901, p. 119) points out that the animal is impelled to serious work by an external want, but to play by his own superfluity of energy.

According to Spencer (1888, p. 626), "the activities of play are united with the aesthetic activities, by the trait that neither subserve, in any direct way, the processes conducive to life." The primary actions of the faculties, bodily and mental, with their gratifications are thus obviously related to proximate ends that imply ulterior benefits. Those actions which constitute play, and those which yield the aesthetic gratifications do not refer to ulterior benefits. It is, indeed, true that activities of this kind may bring the ulterior benefits of increased power in the faculties exercised, and that thus the life as a whole may be furthered.

Spencer (1888, p. 628) further states that lower animals have the common trait that they expend all their forces in maintaining life. They are occupied in searching for food, in



escaping from enemies, in forming places of shelter, and in making preparations for progeny.

As we ascend to animals of a higher type, it is further asserted by Spencer (1888, p. 629), we begin to find that their time and strength are not wholly absorbed in providing for immediate needs. Better nutrition gained by superiority occasionally yields a surplus of vigor. The appetites are satisfied and there is no craving to direct the overflowing energies to the pursuit of more prey or to the satisfaction of some pressing want.

There is a very great diversity of faculties of mind and body and some are called into exercise now and others later. Some occasionally remain unexercised for considerable periods. Because of this fact, Spencer (1888, p. 629) concludes there is stored energy somewhat in excess of the immediate needs of the animal.

It is usually recognized that animals get most of their training for life in the form of play. The playing of kittens with balls dragged in front of them is really training for the chasing of mice. In this manner they are learning to be hunters. The playing of puppies also serves as training for later life. Various animals vary in their play as they do in their other habits. As Lee (1916, p. 9) has pointed out, "their plays all bear some relation to the activities by which they gain their livelihood as adults." Gulick (1920, p. 100) further asserts that in domesticated animals the play life seems to express the instincts needed by animals in the wild state.

We may divide this preparatory behavior, according to Morgan

The first part of the paper discusses the importance of the study and the objectives of the research. It also mentions the scope of the study and the limitations. The second part of the paper discusses the methodology used in the study. It mentions the data sources and the statistical methods used. The third part of the paper discusses the results of the study. It mentions the findings and the conclusions. The fourth part of the paper discusses the implications of the study. It mentions the policy recommendations and the future research. The fifth part of the paper discusses the conclusion of the study. It mentions the overall findings and the final thoughts. The sixth part of the paper discusses the references. It mentions the sources used in the study. The seventh part of the paper discusses the appendix. It mentions the additional information provided. The eighth part of the paper discusses the bibliography. It mentions the list of references. 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(1900, p. 251), under two heads: first, general preparation for varied modes of serious effort later in life; second, special preparation for particular forms of effort in later life. Under the first is included experimentation and movement play. This is spoken of by Stout (1904) as the manipulation plays. Under the second is found the hunting and fighting plays. Constantly on the alert, young animals exhibit shifting phases of behavior, such as curiosity, inquisitiveness, love of mischief, and destructiveness. If a kitten at play is watched for a half hour, a variety of efforts can easily be noticed. The roles played by trial, failure, and success in the gaining of skill, and the control over behavior will at once be evident.

Young magpies peck at every moving object. They pick up, drop, turnover, carry, and pull every loose one. These are experimentation plays as Groos (1898) calls them. He regards this activity as play as it has no serious end and is preparation for the sterner realities of adult life. In young animals, play is, after all, the serious business of this period of life. Its importance for their future welfare can scarcely be overestimated.

Let us now consider the forms of play which afford special preparation for the particular forms of later effort, namely hunting and fighting plays. The way a kitten pats a ball, makes it roll, and then pounces upon it is a characteristic example of animal play. Its value lies in the acquisition of skill under circumstances easier than those presented in serious chase. In the preparatory tussles and squabbles, and playful fights of young animals, Morgan (1900, p. 295) states that experience is



gained without serious risk to life and limb.

The "experimenting" of small children and young animals, their movement, hunting and fighting games, which are the most important forms of play, Groos (1898, p. 7) believes, are not imitative repetitions, but rather preparatory efforts. They come before any serious activity, and evidently are useful in preparing the young creature for it by making him or her familiar with it. The young animals seem impelled by some irresistible impulse to make preparations for their serious activities in this way.

There are also feelings and emotions which we suppose to accompany play. It is the thwarting of free action which is the source of much of the discomfort of the young. According to Morgan (1900, p. 255), unimpeded and vigorous behavior produces an emotional tone which cannot be named in better terms than "good spirits" and the joy of existence so forcibly suggested during the free play of youth. There is no more pitiful sight than that afforded by the young animal confined and suffering from ennui and depression. As a result, all of its body processes are slowed down and are sluggish. Groos (1898) assigns an important place to pleasure in the possession of power to this psychological aspect of play.

Lee (1916, p. 9) states that in the case of a kitten chasing a ball, its whole activity is awakened by the presence of the object. The purpose has taken possession of its soul and is ruling every nerve and muscle from the troubled brow to the spike



of the quivering tail. What possessed it was the passion and ecstasy of pursuit, to which the physical organism conformed as best it could. Lee (1916, p. 9) further asserts "a kitten playing is a hunting demon, a soul of fire, a spirit that outruns all possible expression."

Groos (1898, pp. 75-76) contends that the surplus energy theory is a condition favoring animal play, but it is not a necessary condition, since animals often play when they are tired out. Animals cannot be said to play because they are young and frolicsome, but that they have a period of youth in order to play.





## TYPES OF PLAY

Groos (1898) classifies the play of animals under the following nine heads: (1) experimentation plays, (2) movement plays, (3) hunting plays, (4) fighting plays, (5) constructive arts, (6) nursing plays, (7) imitative plays, (8) curiosity, and (9) love plays. The writer intends to discuss these types of play using Groos as the chief reference.

By the term experimentation, according to Groos (p. 85), is meant "such movements of young animals as enable them to first win the mastery over their own organs, and then over external objects. It includes stretching and straining the limbs; tasting, seizing, and clawing; gnawing and scratching; exercising the voice and making other sounds; rending, pulling, tearing, tugging, kicking, lifting, dropping objects, etc." Such movements are important because they aid the animal in getting the proper control of the body and muscular co-ordination.

A young polar bear that Groos (p. 87) observed often lay on its back and bit its paws or tried to tear a piece of paper. He also frequently noticed that young bears made a humming kind of sound, ending with a smack, when they sucked their paws.

The impulse to experiment continues to advance with age, so that the fully developed animal probably feels something of the pleasure in exercising power, in being a cause.

Romanes (1882, p. 484) reports that his sister has made some very remarkable observations in regard to the play of a monkey.



The monkey obtained a hearth-brush and found the way to unscrew the handle and when he had done that he tried to screw it in again. At first he put the wrong end of the handle into the hole, but turned it around the right way for screwing. When it would not hold, he turned to the other end of the handle and carefully stuck it into the hole and began to turn it the right way. This was a difficult feat for him to perform, for it required both his hands to hold the handle in the proper position.

Animals often amuse themselves by making noises. Voice practice is very common. The puppy attempts to bark. Groos (1898, p. 97) is inclined to believe "that even the howling of a young dog may be a kind of play....Then there are the deafening cries of the howling ape, considered by many as only an amusement....In many cases the vocal exercise consists of learning a simple or complicated decoy cry that is usually connected with courtship."

Hudson (1892, p. 227) relates a very good example of voice practice. This concerns the crested screamer or chakar (Chauna chorarria) which has a very loud voice. While traveling he came at noon to a lake on the pampas called Kokel. Chakars were gathered along its shores and were arranged in well-defined flocks, averaging about 500 birds to a flock, which seemed to extend all around the lake. One flock nearby began vocalizing and continued its powerful screaming for three or four minutes. When this ceased, the next flock took up the clamor and so on until the notes came from the flocks on the opposite shore. At





length the sound came from the group by his side again. He was astonished by the orderly way in which each flock waited its turn to clamor. On another occasion he was impressed when he heard the largest number of birds he had ever found congregated at one place vocalize all together. This was on a southern pampas, at a place called Gualicho. The chakars were scattered about in pairs and small groups. At about nine o'clock in the evening, the entire multitude of birds burst forth in loud screaming. He seemed to be able to distinguish hundreds even thousands of individual voices and was greatly impressed, but his host informed him that a similar concert was given each evening.

By movement plays Groos (1898, pp. 100-102) means those plays that involve change of place for its own sake. He refers "only to such plays as are concerned with practice as such, where the walking, running, leaping, climbing, flying, swimming of the animal finds its object in itself." Romanes (1882, p. 242) refers to the play of fishes. Groos is not fully convinced, but still considers it highly probable that movement plays occur among fishes.

Groos classes the learning to swim of aquatic birds among play movements. Here he believes the parents assist instinct, and so hasten their preparation for life's task. Old swimming birds not infrequently are found carrying their young on their backs and then sliding them off into the water. This as the flying of birds is play until used in the search of food at which time the play changes to serious activity. This transition,



according to Groos (p. 107), takes place quickly in birds, but "is just as really a playtime as is the longer period of" preparation "of beasts of prey." Birds of prey have beautiful gliding motions which are used principally for reconnoitering and in connection with courtship, but it may well be supposed that the birds sometimes exercise their skill from pure pleasure in the movement.

Hudson (1892, p. 269) regards the dances of birds as purely playful. He asserts that the spur-winged lapwings are so fond of their dance that they indulge in it all the year round at frequent intervals during the day, and also on moonlight nights.

Groos (p. 110) includes the swinging of birds among the movement plays, as captive parrots and canaries swinging on a ring.

It is further asserted by Groos (p. 112) that caged animals do not have a sufficient outlet for their energies and their movements are playful and serve as good examples of discharge of superabundant nerve force. The tiger's ceaseless walking up and down, the constant waving to and fro of badgers' and bears' forepaws, and the moving in a circle of many caged foxes are examples of movement plays.

The same author (p. 114) states that kittens engage in many purely playful motions. They prefer straight lines and sharp turns to the circles of dogs. They also take sudden leaps into the air, which are useful later when pouncing on their prey and also when escaping from their enemies.





According to Groos (p. 117), the movement plays among monkeys can be divided into four groups: climbing, leaping, swinging, and dancing. These plays are well known to all who have visited the zoo. Similar activities have also been observed by Hornaday (1923), Garner (1900), Bennett (1834), and Yerkes (1929) among captive monkeys which have been allowed considerable freedom.

In the case of hunting plays instinct appears to be of great importance for here the animal practices sheer sport movements which will be used in earnest endeavor later. This class of play Groos<sup>(p. 120)</sup> divides into three groups: (a) play with actual living prey; (b) play with living mock prey; and (c) play with lifeless mock prey, c. g., with a stick of wood, a ball, or other such objects.

Play with actual living prey<sup>(p. 121)</sup> is illustrated by a beast of prey which seizes its victim and does not kill it, but temporarily releases the slightly wounded creature. When the latter takes flight, it is recaptured, perhaps shaken a little, and is again set free. Now the captive often lies motionless, perhaps to feign death. The beast of prey teases its victim until it again attempts flight and is again recaptured. "In this way," says Groos, "play goes on until the victim really dies and is devoured."

Playing with mock prey, Groos (pp. 123-124) believes, is demonstrated when an animal plays with another as he would with prey. Here both are playing and it is of value in practice for the serious tasks of later life. The pursuer is far more active and interested in the game than the fleeing one.





Groos (p. 130) states that play with lifeless objects is common among dogs and cats. The sportiveness of kittens is alone sufficient to prove that play is founded on instinct. Just as soon as their eyes are open they toy with every rolling, running, sliding, or fluttering object within reach. Apparently the kitten does not recognize mock prey as such at this early stage. The same author cannot be sure, however, that it believes it is dealing with real prey. Hudson (1892, p. 40) tells of a tame puma which was delighted when a string or handkerchief was waved before him.

Fighting plays, according to Groos, must be regarded as preparatory for the struggle for the female. Most carnivorous animals are as pugnacious in conducting their games together as when in contact with actual prey, and their chasing games very easily lead to fights.

The same author (p. 136) asserts that "teasing arises when the desire to fight either does not seek or cannot find direct satisfaction." The animal delights in provoking others and "pesters" them. Bennett (1834), when bringing apes to Europe, had one in the group that often seized other monkeys by the tail and dragged them about the deck.

It is further asserted by Groos that tussling among young animals is very common. All kinds of puppies are indefatigable in playful romping and in this way gain much that is needful in later life. Very early they chase each other awkwardly and try to seize the opponent's throat.



Bears stand upright when they fight, in the manner of squabbling boys. Young polar bears are fond of playing roughly with their mothers. Young horses, donkeys, and zebras tear madly over the plains and then rear up at each other. Goats fight in a similar way and they, too, often measure strength in friendly rivalry. Groos (p. 144) reports having seen two Madagascar monkeys wrestling just as dogs do, except that the play became more complicated because they were able to hold on with both their hands and feet.

Playful fighting, Groos states (p. 149), even exists between adult animals. Many a grown animal still takes pleasure in mock combat and has not forgotten how to keep within the bounds of play. Groos questions that such playful fighting occurs during the breeding season. Often they appear to be showing merely their superiority and seldom overstep the bounds and harm each other.

Groos (p. 150) believes that constructive arts which have to do with building are not in general playful. Only in special cases can they be spoken of as such. The so-called thieving of crows and ravens shows their delight in carrying small, bright objects to their nests. The bower bird adorns its nest, and builds a playhouse for purposes of courtship and decorates it. Both sexes work in its construction, but the male is the director. In connection with these cases, Groos has called attention to the desire to experiment with, or to get possession of, objects and to the fact that this interest is usually directed toward bright





and gaily colored objects.

Groos (p. 167) reveals that his interest in nursing plays was furthered by his study of human play. He desired to attempt to discover if there was anything analogous in the animal world to the playing with dolls by children.

Romanes (1882, p. 495) relates he brought a very good toy imitation of a monkey into the room with an ape. The monkey mistook this toy for a real animal and manifested curiosity, mixed with alarm, when it approached him. When this figure was placed upon the table and was left there, the monkey was afraid to approach it.

Groos (1898, p. 170) further asserts that those cases in which the mother has been robbed of her own young and has the young of some other animal thrust upon her by some experimenter cannot be considered examples of the adoption of foster children which might suggest play.

According to Groos (p. 173), while the instinct to care for the young is strongest in the female, it is not wanting in male animals, and even among the fiercest animals the male assists in caring for and rearing the young.

In his conclusion concerning nursing plays, Groos (p. 178) states "play characteristics are, however, unmistakably present when experimentation and the desire for ownership are combined with the fostering instinct, and also when half-grown birds assist in caring for the younger ones. This latter seems" to him "the veritable play of young creatures, in which, however,



imitation is perhaps as much involved as the nurturing instinct."

Imitative play, according to Groos (p. 181), is engaged in by animals, usually among the higher types and especially among the young. It is often thought that this is peculiar to gregarious animals. A flock of birds will watch quietly when man approaches and when one flies, those near it are soon excited and they fly away also.

Groos (p. 191) gives an example of imitation from the activities of two polar bears. The young one imitated the movements of its mother. There was a large flat stone in the bear pit. The mother at one time found this stone to lay directly in her way and stepped over it. The little one that was following tried to clamber over it too, and accomplished it with some difficulty.

Hudson (1892) mentions that young lambs will follow anything or anybody. Groos (1898, p. 192) states a dog goes over a ditch and all its companions follow. Similarly, if one barks, it excites the rest to bark at once.

Romanes (1882) considers the song of birds instinctive but more quickly and perfectly expressed when the parents serve as models. Many birds imitate, but of all birds, parrots are the ones that manifest playful imitation most strongly.

Groos (p. 214) states that "curiosity is the only purely intellectual form of playfulness that" he has "encountered in the animal world." Among dogs this tendency is seen in the great attention a strange dog attracts. In fact, the function of a





watch dog is based on the existence of this very trait. Romanes (1882, p. 247) speaking of fishes mentions that curiosity is shown by the readiness or eagerness with which they will approach to examine any unfamiliar object.

Certain birds, Groos (pp. 220-221) asserts, are curious and fall victims to their curiosity because they can be lured by unfamiliar objects. Caged parrots, canaries, and ravens are very prone to examine anything near or in their cage.

According to Groos (p. 229), the love plays differ from other types of play in that they are not mere practice preparatory to the exercise of an instinct, but rather its actual working. In birds they include the musical performances, the arts of flying and dancing, and the strange and beautiful colors and their display. The above mentioned activities, Groos believes, are ways in which the male endeavors to overcome the coyness and the reluctance of the female.

What justification is there in calling these antics play? Groos (p. 248) answers this question as follows: "If the adult bird practises his skill in flight and song out of season and simply from good spirits, that indeed is play, and the gambols and dallyings of young immature animals are as much play as their romping is."

Groos (pp. 253-254) contends that just as a strong man sometimes takes pleasure in doing some severe physical task, so we may suppose the wooing bird enjoys his own agility and skill, and exercises these as play.





Groos (p. 254) first discusses the love plays among young animals. He refers to songs, dancing, and flying evolutions which are practised by young birds in their first autumn too early to serve the purpose of reproduction. The expression of this awakening of love by joyful song early in the spring, according to Groos, is genuine play for it is practice for instinctive activity quite as much as the chasing and fighting of young animals.

Courtship by means of the arts of movement, Groos (p. 257) states, is common to spiders, fishes, birds, and mammals alike. In the case of birds this activity may take either the form of dancing motions or flying evolutions. It would seem that skill in flight served to display the male's beauty and agility to his mate, while dancing is better calculated to call attention to and emphasize brilliant colors and advantages of form. Hornaday (1923, p. 240) reports that cranes have been seen to dance and seem to take pleasure in going through the various movements. The display of the turkey and peacock are well known by everyone.

Groos (p. 266) contends that courtship by means of the display of unusual or beautiful forms and colors is playful only when the animal making the display is intelligent enough to be conscious of the self-exhibition. The tumbling about in air which is common with so many birds, the upward flight and quick descent, certainly serves to show their coloring. Many examples will be given later which will seem to prove that the charms of



the birds are displayed to best advantage and the vanity thus displayed at these times strengthens the probability of self-consciousness.

According to Groos (p. 271), courtship is also accompanied by noises and tones. There is very little that can be called vocal art in the courtship of animals, although some demonstrations are made, especially among monkeys and cats.

Among birds, as Groos (p. 278) has pointed out, we note readily the characteristic song. During the mating season, the males seem to produce the notes with more force and even seem aware of their strength. It is not uncommon to see them swell their breasts, spread their tails, flap their wings, and turn from side to side as if they wish to express joy in the possession of their voices.

The instinctive coyness of females, according to Groos (p. 284), is the most efficient means of preventing the too early and too frequent yielding to the sexual impulse. The female tends to prevent the male's approach, which can only be overcome by persistent pursuit and the exercise of various antics. In the case of spiders, the female even invites the male's approach until he shows some eagerness, then her coquetry manifests itself in fleeing. This flight and resistance on her part, though not play pure and simple, takes on something of the character of a game and tempers the rough force of instinct.

This coquetry, Groos (p. 286) states, is exceedingly widespread among birds. The male is usually forced to exercise all





the arts described in some of the preceding pages to win over his mate who in her persistent allurence seems to include an element of a mischievous playfulness.

1871  
The first of the year was a very cold one, and the  
winter was very severe. The snow was very deep,  
and the ice was very thick. The weather was very  
cold, and the wind was very strong. The snow was  
very deep, and the ice was very thick. The weather  
was very cold, and the wind was very strong.

## IV PLAY OF INVERTEBRATES

## ARACHNIDS AND INSECTS

According to Pycraft (1930, p. 151), play is found among very few insects and only when they are in the adult stage. Some insects such as the bees have no playtime at all and most beetles are too sluggish to give themselves to such frivolity. Among the arachnids there are many playful antics during the mating season.

Much has been written concerning the courtship antics of spiders. The Peckhams (1889, pp. 37-38) placed a female of Sartis pulex in a large box and the next day a male was put in with her. He saw her as she stood some twelve inches away. He at once moved toward her and when some four inches away began some remarkable performances. Raising his whole body on one side by straightening out his legs, and lowering it on the other by folding the first two pairs of legs up and under, he leaned so far over as to be in danger of losing his balance, which he only maintained by sidling rapidly toward the lowered side. He moved in a semi-circle of about two inches and then instantly reversed the position of the legs and circled in the opposite direction, gradually approaching nearer and nearer to the female. Now she rushed toward him while he raising his first pair of legs, extended them upward and forward as if to hold her off and slowly retreated. Again and again he circled from side to side and she gazed toward him, evidently admiring the grace of his antics. This was repeated until one hundred and eleven circles ( by



actual count) had been made by the ardent male. Now he approached nearer and nearer, and when almost within reach whirled madly around and around her. She then joined and whirled with him in a giddy maze. Again he fell back, and resumed his semi-circular motions with his body tilted over. They both drew nearer and mating was accomplished.

The males belonging to the family Attidae vie with each other in making an elaborate display, not only of their grace and agility, but also of their beauty before the females. The females, the Peckhams (1889, p. 60) further state, after attentively watching the dances and tournaments which have been executed before them, select for their mates those they find most pleasing.

When a male perceives a female, the Peckhams (1894, p. 245) report, he lifts his head with an alert and excited expression, and rushes toward her. When he is within about four and one-half inches from her, he begins the regular display of this species which consists of a peculiar dance. The male extends his firts pair of legs at a right angle to the cephalothorax and turns his abdomen first to one side and then to the other.

The rule for the male of the genus Attus, according to the Peckhams (1890, pp. 122 and 145), when dancing before the female, is either to raise or stretch out the first legs, the apparent object being to display the colored hairs and other appendages which are ornamented with them. Whatever color the male possesses, he displays before the female to the best advantage. The





female is very coy and usually runs away until after the male has displayed and danced before her. The female then watches the love-antics of the male with great attention and directs her head now here, now there, as he moves about. As he continues his mad antics, her actions give every indication of pleasurable excitement. In the genus Pulex the female finally joins the dance of the male and whirls around and around as though intoxicated.

The male of Synageles picata, unlike most of the attid males, according to the same authors (1890, p. 121), keeps all his feet on the ground during his courtship. He raises himself on the tips of the posterior six; he slightly inclines his head downward by bending his front legs, their convex surface being always turned forward. His abdomen is lifted vertically so that it is at a right angle to the plane of the cephalothorax. He then sways from side to side. After a moment he drops the abdomen, runs a few steps nearer the female, and then tips his body and begins to sway again. He runs now in one direction, and now in another, pausing every few moments to rock from side to side and to bend his brilliant legs. The attitudes taken by the male serve perfectly to show his "fine points" to the female.

The male of Habrocestum splendens, according to Emerton (1902, p. 45), approaches the female and lifts his abdomen into an almost vertical position so that the red color shows from the front. Then he rises on the tips of his feet and with the front legs off the ground and pointing forward, he dances back



and forth sidewise in front of her, gradually drawing nearer. At intervals he stops and turns his back to her and then faces her and dances again.

The males of the Dendryphantes capitatus, the Peckhams (1889, pp. 45-46) state, are very quarrelsome, sparring whenever they meet, chasing each other about and sometimes clenching their mandibles. Their movements are always very quick and yet the Peckhams were unable to ever discover a wounded individual. When courting the female, the male approaches her rapidly to within two to five inches when he stops and extends the first pair of legs directly forward close to the ground, the legs being slightly curved with tips turned up. This position serves admirably to expose the whole of the bronze and white face to the attentive female watching from a distance. The male gives his palpi a circular movement and as he grows more excited he lies down on one side with his legs extended. These antics are repeated for a long time, often for hours; then at last the female, either won by his beauty or worn out by his persistence, accepts him as a mate.

In some spiders, according to Pycraft (1914, p. 237), the abdomen bears a horny collar, which is toothed and these teeth, as the abdomen is raised and depressed, scrape against a number of delicate ridges on the thorax. The grating of these opposing surfaces against one another produces shrill rasping or chirping sounds which seem to be designated to inform the female of the presence of the male.





In the case of spiders many more examples of the mating antics similar to these given have been observed by both the Peckhams (1889, 1890, 1894) and Emerton (1902). The male is usually smaller than the female and engages in various antics, plus display to win over the larger and often more ferocious female.

Among insects there are few examples of play. The mayfly is rather curious in that the larvae spend their life in the water and that the adult span of life is indeed very brief. After the transformation takes place, the mayfly executes an aerial dance. Some species never see the sun. The dance is a "Dance of Death" and it is performed by a very great host. It is curious, Pycraft (1914, p. 228) says, that these creatures which never see the sun should be attracted by light, since they swarm around lamps. In this dance they are as gay lovers, dancing a marriage-dance, with many males to each female. Hegner states (1935, p. 214) that those which are not attracted to the bright lights and thus go astray, dance through part of the night, but die before morning.

Pycraft (1930, p. 151) reports that the adults of a small house fly known as Fannia goes around in wide circles in the center of a room and often around a light. They turn and twist around one another with incredible speed, as though performing some "favorite waltz." These performers are not feeding, nor searching for food, therefore it may<sup>be</sup> supposed they are animated by the sheer "joy of living."



Wheeler (1924, p. 490) has recorded the strange behavior of a fly (Cardiacephala myrmex). For two weeks the flies could be observed going through the performance on any sunny morning or afternoon. More than a dozen of both sexes had selected and used for many days as a playground the large horizontal leaves of some bush growing along the edge of the jungle trails. The flies ran about with jerky movements and the females seemed very coy. Occasionally a male would face a female and perform a peculiar dance. Stepping first to one side and then to the other, he would sway his abdomen towards her and at some times downward till it struck the surface of the leaf. He was observed doing this from three to four times. The male has a beautiful iridescent surface on his terminal abdominal segments and he appeared to be displaying it.

Wheeler (1928, p. 151) further asserts that the male of the Micropezid fly, if observed when alone, may be seen to stand still and regurgitate from the tip of his proboscis a small drop of liquid which he at once swallows, only to produce another drop and withdraw it in turn. This often is repeated several times, and the male is apparently amusing himself in this strange way.

Aldrich and Turley (1898, p. 810) report that the male of a certain species of Empis constructs a hollow "cocoon" or "balloon" for the purpose of attracting the female. She is given the "balloon" and toys with it during mating, afterwards dropping it. The "balloon" is constructed while the male is flying in the air



(p. 809). A dead insect is usually found imbedded in the front end of the "balloon" and has apparently served as a stimulus for its construction. The female was further observed to select for her mate the male which carried the largest "balloon."





## V PLAY OF VERTEBRATES NEWTS AND REPTILES

Among vertebrates we find many more examples of play than among invertebrates. However, in the first groups, newts and reptiles, only a few instances of play have been observed as compared with those recorded concerning birds and mammals. Among these lower vertebrates we find some actions which are apparently mere play, others which seem to serve as preparation for the more serious activities of life, and still others that take the form of amorous play during the mating season.

According to Pycraft (1914, p. 170), among newts and salamanders the male commonly executes a very animated display which is followed by a rather remarkable behavior. The display, which is always associated with vivid coloration or development of fin-like frills along the back, takes the form of amorous writhings and other gesticulations. At times he will bite his mate with his snout, and at others he will simply rub her side. These antics may be followed by an embrace.

In reptiles, Pycraft (1914, p. 164) reports, some play is found manifest only during the mating season. The crocodile executes most undignified caperings in front of his mate. He twists and turns or rather twirls on the surface of his chosen pool with his head and tail raised high in the air, his capacious barrel of a body being swollen out to the bursting point. These antics, according to the same author (1930, p. 156), are performed to the accompaniment of roars heard at no other season of



the year. The emotions of the female are not aroused except by this immense expenditure of energy.

The giant tortoise, it is reported by Hegner (1935, p. 354), stalks about the female in a circle, frequently stopping in a position facing the side of her shell. He raises himself as high as his stubby limbs will permit and batters his shell against hers, thus producing resounding thuds. This whole activity appears far more ludicrous than romantic. At such times the males usually utter deep, trumpeting calls.





## BIRDS

A most striking feature of bird-life, according to Pycraft (1922, p. 53), is its restless activity. In the spring it manifests itself in outbursts of song, strange antics, or wonderful evolutions in mid-air.

Huxley (1923, pp. 254-255) has observed the courtship activities in the Red-throated Diver. The post-mating ceremonies are essentially mutual. The commonest is the "snake ceremony," the incentive to which may be given by either sex. This ceremony, like the pre-mating one, may often be "self-exhausting."

The same author (p. 255) describes the so-called 'Plesiosaur race,' as follows: "This ceremony was so christened because the attitude adopted by the birds in its performance made them resemble miniature Plesiosaurs half out of water." Usually two or three birds participated but there were sometimes four. The birds depressed the hinder half of the body below the water; the body was held at an angle so that the breast and shoulders projected out of the water. The neck was thrust upwards and forwards in a stiff position. In this attitude the birds swam through the water, accompanying one another. They would swim for some distance in this way; then they would often turn and continue the process in the opposite direction. The whole ceremony did not give the idea of a true pursuit, but was more like a race. Because of the snaky appearance of the neck, this ceremony is sometimes called the "snake ceremony."



These birds were often observed by Huxley (p. 256) to be engaged in curious and apparently meaningless actions when not actually engaged in the sexual ceremony. The most frequent was that of dipping the beak in the water. This would often be repeated several times within a few minutes. It was sometimes varied with "looking into the water," in other words, submerging the beak and forepart of the head for some time and then shaking the head. Another type of activity is the so-called "splash dive." In this case, instead of submerging quietly, almost without a ripple, as is done when the birds are diving for food or escaping danger, the bird gives a sharp kick with the legs as it dives, sending a shower of spray into the air. This dive is for a very short distance as the bird emerges generally about five or six yards away. This type of activity may be an expression of anger as well as a form of sexual excitement.

A single Red-throated Diver has also been observed by Huxley (1923, p. 265) ascending to a great height and then descending headlong. During the descent, the bird twisted and turned so that the air rushed through its feathers making a noise "like a train." Such downward flying is well-known among many birds, especially the Rook. It seems that the actions are truly pure play and have nothing to do with the courtship antics.

Townsend (1923, pp. 267-268) describes a typical dance performance of the Gannets. The sexes cannot be distinguished because the plumage is the same. One of them is seen swinging around in great circles on rigidly outstretched and motionless





wings. It alights on the edge of a rock ledge crowded with brooding birds and pushes them roughly on its way to the nest. It is instantly greeted by the mate which rises to participate in the dance. The birds stand facing each other, the wings slightly raised, and the tails elevated and spread. They bow, raise their heads, and wave their bills. They may continue these actions for several minutes. One bird then indicates that the dance is ended by returning to the nestling, while the other usually flies away. This dance is not only performed by pairs but sometimes by individuals.

The so-called song and accompanying contortions of the Bittern, according to Forbush (1931, pp. 317-318), make up one of the most remarkable performances indulged in by any New England bird. At the moment of emitting his dolorous "love-song", the violent contortions of the Bittern simulate those of a nauseated person, as it apparently is inflating its gullet with air. The preliminary motions were a forward thrust of the head with opened beak whereby air was gulped. This would be repeated perhaps five or six times, and during the operation a strange swelling and contortion of the neck could be plainly seen. There would be a downward movement of the enlarged part of the neck and this at once was followed by the explosive eruption of air--"the boom"--closely followed by a second sound, a clear syllable "ka." The utterance of these "pumping" notes occupies little more than one second. At the second note, the bird's head is thrown up quickly with its bill pointing skyward.





There is, according to Forbush (p.319), also a display of light-colored or white feathers which sometimes accompanies the above performance. There are about nine or ten light-colored, fluffy feathers which appear on the male during the mating season. In display they are usually erected and spread like ruffs, nearly meeting behind the neck.

This same author (p. 320) also has observed the male seeking the female at evening. The male bows, calls repeatedly, and often rises high in the air with erratic flight and a variety of peculiar notes. On returning to the ground, he struts about with lowered wings and spread tail, like a Turkey-cock. While strutting thus with his upraised tail almost touching the back of his retracted head, the male has been observed by Forbush to actually trip over twigs or sticks in his path.

Allen (1931, p. 143) describes the "winnowing" of the Woodcock. The bird mounts into the air on a great spiral, "winnowing" or "chippering" as he rises, his wings apparently fanning the air more rapidly than in normal flight. When almost out of sight, he flies in great circles alternating the weird wing "chippering" with vocal notes. The bird then zigzags back towards earth silently or with five or six vocal sounds at the first part of the descent. Forbush (1931, p. 388) adds that this entire performance in the air usually seems to occupy about five minutes. As soon as the bird has alighted, it begins the peculiar call with which it started.

The Wilson's Snipe also has a most remarkable performance



in its song flight as observed by Forbush (1931, pp. 393-394). The male circles high in the air and each circuit appears to be a mile in its circumference. The Snipe apparently rises diagonally through the air, with rapid wing beats, and then glides off sidewise and downward in a curious, wavering, sidelong manner. His wings beat as before, but his body appears to wobble a little. The above author has observed the performance to last nearly half an hour. The sounds produced in this flight are supposed to be made by the outer quills of the wings and tail. This is apparently a part of the mating display of this bird, but in courtship the male struts about the female in the manner of the Turkey-cock.

The courtship of the Golden Eye begins in the late winter on the waters near Massachusetts. Forbush (1931, p. 243) describes the antics. The male swims about the female, often with his head lowered and his neck stretched along the water. The most characteristic motion of the male is that of raising his head upward and backward until with his bill pointing toward the zenith, he utters his harsh note. Often the bird dashes forward while the orange-colored feet strike backward and upward with such force that they throw jets of water into the air, and at the same time display brilliant coloring.

The Ruffs, as has been observed by Selous (1907, p. 60), are very interesting in their antics. When a Reeve arrives, the other birds sink down on the ground and remain prostrate while she stands in about the center of them quietly preening herself.





Among these birds there is sometimes bustle, but no real fighting. The fighting or bustles, as Selous (p. 61) calls them, consist mainly of little runs or turnings while they are still crouched to the ground. They are of very short duration, just a spring or two which are often only a threat.

Display is apparent among these birds but it is not of the formal type. The best example cited by Selous (1907, p. 64) was that of a darting male. He rushed away from the female, turned and darted back again to her side with his ruff swelled out almost encircling the neck, wings drooping, head and neck drawn back, and tail raised high in a perfect fan. He seemed for a moment to overwhelm her with his gallant show. According to the same author (1906, p. 216), the female when she becomes excited struts in the same manner, although her ruff is smaller and less conspicuous. Selous further states (1907, p. 178) that these birds fight and enjoy one another's society at about the same time. An idea of sparring overtakes them at intervals. This sparring may be with tremendous fury and energy but often lasts for only two or three minutes at a time.

The Golden and Amherst Pheasants are among the most gorgeously clad birds. The use of the cape-like frill of long, highly-colored feathers is very noticeable. The male, according to Pycraft (1914, p. 99), will at times place himself sideways before the female, drawing the frill around to the side facing her, and drooping the wing in order that she may miss nothing of his resplendent livery.



The courtship of the Peacock illustrates in an extreme form the display of color. It also includes two other factors of dance and song. According to Townsend (1923, pp. 259-260), in the presence of its mate and when in an amorous mood, the male erects the stiff tail feathers and walks with mincing steps, turning this way and then that, so that his beauty may be seen from all points by the hen who walks carelessly by. Suddenly he turns and flashes the full radiance of his beauty directly at his mate, he vibrates his downward stretched wings and quivers his stiff tail feathers so that they give forth a sound of rattling reeds. The great bird bows towards the object of his affection, emits a raucous cry, and beseechingly moves towards her.

Not all birds are so well fitted for display as the Peacock, but they have just as remarkable and interesting habits during the mating season. Forbush (1927, pp. 45-46) has observed the Heath Hens which once frequented Martha's Vineyard. The male bird begins to "toot" and strut about four o'clock on bright mornings. Many gather on certain open fields and there the dance goes on until about seven o'clock. The males appear obsessed with their antics and devoted themselves with great enthusiasm to the dance. This exercise consists of running, strutting, bowing, posturing, cackling, calling, jumping up and turning around in the air, and even fighting a little from time to time. Gross (1928, pp. 543-545) describes these sounds emitted during courtship. The "tooting" is prefaced by a short run followed





by a very rapid stamping of the feet. In preparation for "tooting" the neck is stretched out forward, the feathers are spread so that the white undertail-coverts are displayed. As the inflation of the orange-colored sacs begins, the "tooting" sound is heard. If a male bird is disturbed by another male, when in the midst of "tooting," instead of the "tooting" sound a weird squawk results.

Forbush (1927, p. 102) reports that on warm spring days a pair of Marsh Hawks may be seen soaring to a great height, when one suddenly plunges far downward and turns a complete forward or sidelong somersault in the air. As it flies up and down in the air, it appears to be a rubber ball rather than a bird. This behavior usually occurs over the marsh or meadow that has been chosen for a home. When two of these birds are mated or mating, they keep together much of the time. When the female alights, the male follows her. On the ground he bows to her and swells with amorous ardor. Sometimes the male flies alone across the marsh, rising and falling alternately, and with each fall turning a complete somersault, as if to show his mate what a clever and wonderful bird he really is.

The extravagant courtship for which the Flicker is notorious is also described by Forbush (1927, p. 294). A pair of these birds will be together, the female reluctant and coy, the male following her closely from tree to tree. The latter slyly pecks at her from behind a limb, soon becoming bolder sidles up to her, swings his head about and displays the beauty of his spread wings





and tail as he softly calls. When a rival mate appears, each vies with the other exhibiting all his charms to the demure female. One male takes an elevated position on a branch near her side; the other male mounts to a similar place on the other side. Now begins a superlative effort on the part of each male to impress the female with the splendors of his plumage and the pleadings of his tenderest tones. With wings open and tail widely spread, he turns and twists about. He bows and nods, advances and retreats. If the female stands by his side and reciprocates, the male redoubles his efforts, sidling around her, posturing, nodding, tossing his head and swinging it from side to side. His red nape seems to expand and glow in the sunlight and his spotted breast swells. The female finally acknowledges her submission by returning the bowing.

During the mating season, pugnacious males of the Ruby-throated Hummingbirds, Forbush observes (1927, p. 318), dash so rapidly that it is hard for a person to follow them with the eye. In courtship the female flies and the male pursues. This activity is seldom witnessed. When the male displays, the female sits demurely on a twig. The male performs acrobatic feats in the air, charges toward her with amazing speed, stops suddenly, hangs in mid-air, and then backs away. He swings before his mate as if hung from an invisible rod, like the "lob" of a mighty pendulum. The male has been reported to swing back and forth in the air as many as twenty times. As he swings, he displays his glowing gorget to the female below.



The same author (1929, p. 96) further states that the Song Sparrows spend much time in courtship. The females are modest and coy, while the males rival each other in song and flight. They do not pursue the females seriously for although their wings move rapidly, progress is very slow. Song usually accompanies this flight and often the males seem to remain temporarily motionless in mid-air. Rival males often battle desperately. Sometimes they even roll and tumble in the dust with locked bills and wings beating furiously.

The display of the White-breasted Nuthatch is less often observed but is no less interesting according to Allen (1931, pp. 150-151) because, in addition to showing every one of his feathers to advantage, he has the trick of making a present of food to the female. Allen observes these birds at his feeding station every year during the warm days of early April. Two Nuthatches approach, uttering low conversational notes, the female almost coy in the way she follows the male and moves away when he comes too close. Suddenly the male swoops to the food shelf, seizes a sunflower seed, and is back to the waiting female with scarcely a pause. With his wings and tail spread, he presents this food to the female. Occasionally he pauses at the food shelf to remove the seed coat from the seed so that it will be ready to be eaten, but this is by no means a regular part of the ceremony.

Allen (1931, p. 150) states that the Cowbird has no brilliant plumage, but, for an unadorned bird, he makes a supreme





effort at a nuptial display. The juxtaposition of another Cowbird, male or female, serves as a stimulus. He points his bill toward the zenith and compresses his feathers in a subdued manner. The next moment, however, he ruffles his feathers, spreads his wings and tail, and with a shrill hissing whistle he falls forward with quivering wing in an apparent "fit of extreme nausea." So far forward does he fall that he often has difficulty in regaining his balance.

THE UNIVERSITY OF CHICAGO  
DEPARTMENT OF CHEMISTRY  
505 EAST HALL  
CHICAGO, ILL. 60607  
U.S.A.  
TEL: (312) 937-1311  
FAX: (312) 937-1312  
E-MAIL: [chemdept@uchicago.edu](mailto:chemdept@uchicago.edu)  
WWW: <http://www.chem.uchicago.edu>

MAMMALS  
RODENTS, UNGULATES, CARNIVORES

Among the young of mammals we find many examples of play. Some playful antics are well known, as those of the bears, otters, and our domestic pets, dogs and kittens. Most of the observations have been made upon animals in the zoo while very few have been made on animals in their natural environment.

Among the rodents many interesting observations have been made on squirrels. According to Hornaday (1923, pp. 238-239), two individuals of our red squirrel may often be seen racing and chasing to and fro, up and down the trunk of a tree, and across in circles. The red squirrel chatters and scolds chiefly for his own entertainment.

Flying squirrels, as reported by Moseley (1927, p. 79), are often observed playing at sunset. Their large eyes make it possible for them to see well in the dark. The gambols of muskrats, states the same author (p. 79), in the water on a quiet evening are much like the playing of kittens. At times they may be seen on a moonlight night, chasing each other over some sandbar near their watery home.

In the zoological parks, Hornaday (1923, pp. 239-240) states, it is common to see fawns and calves of various kinds butt their mothers. A more common form of infantile ruminant sport is racing and jumping. A red buffalo calf, three or four months old, will begin to run for sheer amusement and in pure exuberance of health. The calf will choose a long open course, usually up and down a gentle slope, and for 200 feet or more race madly to



and fro several times.

Seton (1925, p. 463) reports that an antelope buck has been observed playing with seven or eight kids. They were all careering about, and he was leading. They chased him, capered and pranced around him. After about half an hour, the younger ones became tired and so rested. The buck continued to race by himself as though bent on using all his surplus energies. He would rush at full gallop around the bushes, yet kept close to those resting. Often he would run for ten minutes at full speed and apparently show no fatigue.

According to the same author (1925, p. 513), young mountain goats are often playful. They seem to enjoy performing various antics for the amusement of persons around them. Sometimes they throw themselves down a bank turning a complete somersault on the way down. They also roll down slopes covering themselves from head to tail with dirt and sand.

It is further reported by Seton (1925, p. 186) that the bear is a comical creature and never more so than when it feels good natured and is amusing itself in cumbrous play. When not under the urge of hunger, fear, or the sexual impulse, it is ready to play and show its real nature. It will wrestle by the hour with its cage mate.

Most keepers of animals, according to Seton (1925, p. 186), are thoughtful about the amusement of their charges. The black-bear is usually provided with a large wooden ball as well as trees. Many times blackbears have been seen to lie on their broad fat backs with all four feet in the air twirling a ball with marvelous





adroitness.

In the zoo, Hornaday (1923, p. 233) states, animals are free to play. The same author believes that bears properly caged and tended are the most joyous and playful of all wild animals. They have many facilities for wrestling and climbing in their cages. The cubs begin to play as soon as they emerge from their natal den in March or April, and they continue to play for at least six or seven years. The laughter of the visitors at the bear cage always seems to stimulate the wrestling bears to further effort.

The play of bears, young or middle-aged, Hornaday (1923, p. 234) further asserts, consists in boxing, "catch-as-catch-can," and wrestling. Cubs begin to spar as soon as they are old enough to stand erect on their hind feet. Boxing bears always strike for the head and bite to seize the cheek of their opponent. Bears love to chase one another and in this form of play they show a great amount of activity. Often the bear that is chased has been observed to jump into the bathing pool with a tremendous splash, quickly clamber out, and immediately continue in the chase.

The cubs of blackbears, according to Seton (1925, p. 186), are usually two in number and their playfulness exceeds even that of kittens. They box, wrestle, play "hide-and-seek," and tease their mother. From time to time the mother forces the cubs to climb a tree and remain there for some time.

The blackbear often wrestles with its mate. They tumble around with back-holds and grip-backs. They show an amount of suppleness and quickness that would be the envy of an experienced



wrestler. Good nature and strength are outstanding features of these bouts. When one of the wrestlers has had enough, it signifies that by climbing the center post of their den.

Hornaday (1923, p. 188) describes two large male polar bears who were very fond of playing and wrestling in the water of their swimming pool. One bear had a very spectacular swimming habit. He would swim across the pool until his front feet touched the side and then throw himself over backwards, floating back.

Young polar bears have been found to play on a snowbank. On the sides or slopes of icebergs, paths and furrows have been found which had been made by the polar bears sliding on their stomachs. One little bear, it is reported by MacMillan (1936, p. 363), would walk up the sloping surface, turn around, spread out his front legs, drop down on his breast, and then slide down the slope. The bear would then turn around and go back to do this again.

According to Seton (1925, p. 230), grizzly bears enjoy their play by coasting down steep mountain-sides. They sit down in the snow, put their forepaws on their knees, and hitch themselves along to get a start. They often end the coast with a jump and somersault. Then they select another place to coast.

The same author (1925, p. 250) reports that the racoon has a strong propensity to roll food and other things under its paws. If a pail of water is within its reach after drinking, it will put its paws in as if expecting to find some fish or frog. If anything is found, it will be speedily brought to the surface





and scrutinized. The racoon has been seen to throw chips, bits of china, and pebbles into the pail and then scoop them out for amusement. After playing for some time, the animal usually upsets the pail.

According to Hudson (1892, p. 40), the playfulness of puma cubs is irresistibly pleasing. The puma at heart is always a kitten, and takes unmeasured delight in its frolics. Hudson knew of one puma that was kept as a pet. When it was approached, it would lie down and purr loudly. A string or handkerchief drawn about was sufficient to keep it entertained for an hour. When one person had tired of playing with the puma, it was ready for a game with the next comer.

Persons who had spent much time on the pampas reported to Hudson (p. 41) that on a bright moonlight night, about nine o'clock, adult pumas often appear with their half-grown young. Soon they gambol together, hide behind the rocks, and frequently leap over one another as kittens do.

Mills (1920, pp. 46-47) tells of a mountain lion female which he observed on a ski trip over the Continental Divide in Colorado. She became interested in his ski prints and pounced upon them as if pretending to pick up something. She went away, but later returned and romped again in the ski tracks. She rolled and struck about with the pretense of worrying something she had captured. She repeated this pantomime several times and then suddenly left the scene.

The play of the otter in sliding down a steep toboggan slide of wet and slippery earth to the water below is well known



to trappers, hunters, and naturalists. Hornaday (1923, p. 239) has seen these slides, but has never had the good luck to see one in use. The otters, it is reported by Moseley (1927, pp. 256-257), show great interest in this activity. They will continue for some time. In the course of this play, they wear deep troughs in the mud. The steep bank is kept slippery by the water dripping from their bodies as they climb back in order to repeat the performance. If many are participating, they slide down in rapid succession. They have also been known to slide on the snow in a similar manner.

Mills (1920, pp. 201-203) recounts that a tumbleweed in a Wyoming windstorm furnishes the plaything of an exciting game for a pack of wolves. The weed is blown to the ridge and is chased by the leader, followed closely by the pack. The wind lifts the tumbleweed high into the air. As it starts to descend, one or two wolves leap for it. It disappears into a hollow. When the wolves discover the weed, they fight for possession of it. Soon the well-battered and mashed weed is taken by the wind far across the plains. The play suddenly stops; the wolves stand looking at nothing for a few seconds and then scatter. The play is over.

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## PRIMATES

Next to bears, according to Hornaday (1923, p. 236), the apes and monkeys are the most playful animals in the zoo. It is the young and half-grown members of the company that are most active in play. Fully mature animals are too sedate, or too heavy for the frivolities of youth.

The Yerkes (1929, p. 541) assume that playfulness implies a measure of inventiveness, originality, and individual variability in activity, as well as certain versatility in social adjustment. For this reason it is not surprising to find the greatest amount of play among the young.

Yerkes (1925, p. 87) states that young apes are eager and active for play. They will accept as playmates, children, human adults, and members of their kind. When playing with other apes, they prefer their own kind and size. Children are preferred to adults by the young and adolescent apes. The most common games are running and chasing varied with mock fighting. In their play they are likely to become very rough but cause no intentional injury.

In a mixed company of monkeys, Hornaday (1923, p. 238) reports, a timid or fearsome individual is often made the butt of practical jokes by other monkeys who recognize its weakness. When many monkeys are kept in captivity together, they indulge in play of many kinds and resemble a group of well-fed and boisterous small boys who must "skylark." From morning until night they pull each other's tails, wrestle, roll, steal each other's



## Abstract

The purpose of this study was to investigate the effects of a 12-week training program on the physical and psychological health of sedentary middle-aged adults. The study was conducted in a laboratory setting and involved 30 participants who were randomly assigned to either a control group or an exercise group. The exercise group performed a combination of aerobic and strength training exercises three times per week for 12 weeks. The control group remained sedentary throughout the study.

Physical health was assessed using a variety of measures, including heart rate, blood pressure, and body composition. Psychological health was assessed using a series of questionnaires that measured stress, anxiety, and overall well-being. The results of the study showed that the exercise group experienced significant improvements in both physical and psychological health compared to the control group. Specifically, the exercise group showed a decrease in heart rate and blood pressure, an increase in muscle mass, and a decrease in stress and anxiety levels. These findings suggest that a 12-week training program can have a positive impact on the health of sedentary middle-aged adults.

The study also found that the exercise group experienced a significant increase in overall well-being, as measured by the questionnaire. This suggests that the training program not only improved physical health but also had a positive impact on mental health. The results of this study are consistent with previous research that has shown the benefits of exercise for physical and psychological health. However, the study did have some limitations, including a relatively small sample size and a lack of long-term follow-up. Future research should aim to address these limitations and further investigate the effects of exercise on health.

In conclusion, the results of this study suggest that a 12-week training program can have a positive impact on the health of sedentary middle-aged adults. The exercise group experienced significant improvements in both physical and psychological health compared to the control group. These findings support the recommendation that sedentary middle-aged adults should engage in regular exercise to improve their health. The study also highlights the importance of both aerobic and strength training exercises in achieving these health benefits. Future research should continue to explore the effects of exercise on health and identify the most effective training programs for different populations.

playthings, and wildly chase each other to and fro. There is no end of chattering, screeching, and making funny facial grimaces.

The Yerkes (1925, p. 541) assert that the amount of play among the various types of primates varies greatly. The chimpanzee is by far the most highly gifted of the anthropoids in playfulness and social resourcefulness, while by contrast the orang-utan ranks low. In the gibbon, play is marked and varied, and the adults are even found to be mischievous. In the orang-utan, play rapidly disappears in maturity, and is less developed than in the chimpanzee. The gorilla is similar to the orang-utan.

Bennett (1834, pp. 158-160) describes the relations of a male gibbon with a Papuan child. They were often seen sitting near the capstan of the ship, the animal with his long arm lovingly around the neck of the child, as they ate a biscuit together. In a playful manner he would roll on the deck with the child as if in mock combat. Seizing a rope the gibbon would swing towards her, and when an effort was made to seize him, he would elude the grasp by swinging away. Then he would drop suddenly upon her from the ropes and engage in various playful antics. He would play in a similar manner with adults, but usually found them too strong and rough for him. If, however, an attempt was made by the child to play with him, when he had no inclination or after he had sustained a disappointment, he usually made a slight impression with his teeth on her arm. This was to show no liberties were to be taken with him.

As would be expected, the gibbons took great enjoyment climbing about the ship at sea. They showed great ability in balanc-



ing themselves while playing about the rigging.

There were also other monkeys on board and an Ungka ape tried to encourage social relations. He was repelled in his endeavors by the other monkeys and so, according to Bennett (1834, pp. 160-162), he tried to annoy and punish them. When one was off his guard, Ungka often seized a nearby rope, and swinging toward him, caught him by the tail and hauled him by it. Sometimes he even dragged the monkey by the tail up the rigging quite a distance. Then tired of his labor, he would suddenly let go his hold of the tail and the monkey would have to quickly grasp the rope to prevent receiving a bad bruise by a rapid fall to the deck.

It is reported by the Yerkes (1929, pp. 71-72) that the baby gibbons, or "chenees" as the Siamese call them, make fascinating pets. In Bangkok, there are hundreds of tame "chenees" which cling to their owners and travel around the house or compound. The gibbon is far too mischievous and inquiring in temperament to be allowed to run free. They are not kept in cages, but fastened by a collar and ring to a chain that permits them to dash about. They are incessantly active and twist and turn and leap about. They are generally friendly, but their sense of humor is usually of the slapstick variety.

A gorilla which lived with Garner (1896, p. 228) for a time in the jungle was a very sober, solemn creature and nothing could arouse a spirit of mirth. The only pastime he indulged in was turning somersaults. Almost every day at intervals of about an





hour, he would stand up for a minute, then put his head upon the ground, and look at Garner as if expecting his applause. He would frequently repeat this act a dozen times, but never smiled or evinced any sign of pleasure.

Dinah, according to Garner (1900, p. 103), was a peculiarly good-natured animal who enjoyed tickling and was as ready to romp as a tomboy. Her poses on the trapeze would arouse the envy of a professional acrobat. She would play with a bunch of straw, toss it against the wall, catch it in her hands, and scuffle in a boisterous manner as if it were a living thing trying to escape from her.

There is interesting information reported by Yerkes (1925, p. 145) concerning the play of a young captive mountain gorilla with dogs. Congo was often playful, sometimes making the initial advances and at other times responding willingly to approaches. Occasionally, she would play vigorously with her dog friends, Bobby and Betty, until they were tired out or frightened off. Her play was extremely simple, consisting of chasing or the reverse, climbing, a sort of hide-and-seek, and foot cuffing. There seemed to be no indication of invention of games or any other variation from these simple activities already described.

Othello, another gorilla which Garner (1896, p. 232) had under observation, enjoyed turning somersaults with a native boy. In his play he seemed to gain a great deal of pleasure. It was amusing to see him with the actions of a romping child and the face of a cynic. He never played with Moses, a chimpanzee.

The gorilla, according to Garner (1900, p. 236), does not



imitate man nor yield to the influence of civilized life. All his actions are deliberate and cool. He will climb around on trees and turn somersaults if kept tied with a long line. If one is released, he immediately tries to escape into the forest.

The information concerning the playfulness of the orang-utan is somewhat contradictory, due possibly to extreme variations in behavior with age. It is stated by the Yerkes (1929, p. 139) that it is definitely known that young animals are somewhat playful among themselves and eagerly seek amusement by contact with other animals. In common with the other anthropoid apes they prefer children to adults as playmates.

Hornaday (1885, p. 383) describes the playful behavior of his young orang-utan captives. One grew fat and mischievous and played many an absurd childish game upon the floor with his keeper. One of his favorite activities was to seize Hornaday's hand suddenly and draw it to his mouth and feign giving it a terrible bite. He always knew that he must bite gently. Often he would entertain for half an hour by making the most comically wry faces. He was also a great contortionist.

There is considerable information concerning the behavior of a young male orang-utan when confronted with a large mirror, according to the Yerkes (1929, pp. 138-139). When he first observed the reflection of the cage, he paused. Presently his curiosity drew him to the mirror, but he approached without the haste commonly exhibited by other monkeys. When he saw his image in the glass, he paused suddenly, his hair bristled, his lower lip was protruded, and he hurriedly retreated to the farthest





end of the cage. Several times he regained his confidence, but always lost his courage and fled from the image. Then he grew bolder and threw various articles such as a wooden hammer, crusts of bread and such at the head of the mirror image. At last he became friendly in his actions and displayed a ball, rolling it about and apparently inviting the other animal to play with it. He tried to attract the image as he would attract the attention of a child.

Yerkes (1916, p.70) reports that Julius, a young orang-utan, took to playing with sawdust on the floor when confined. He would take the sawdust up in one hand and pour it from hand to hand until all had slipped through his fingers, then he would scrape together another handful and go through the same process. Often he became so intent on this form of amusement that even when the exit door was raised, he would not immediately go to get the food.

When methods were used to force Julius to use greater effort during Yerkes's experiments, he would become fatigued and then developed the habit of rolling around from the exit door to the starting point by a series of somersaults. When the task became irksome and he was discouraged by repeated failures, he deliberately turned away from the box and neatly executed a somersault on the floor of the cage. Often after he had fallen from boxes used in the experiments, he would roll himself into a ball and childlike play with his feet.

According to the Yerkes (1929, pp. 175-176), fooling appears to be less conspicuous in the orang-utan than in many monkeys.





Curiosity manifests itself in these animals but a basis for comparative statements is lacking. Captive orang-utens, especially when young, have frequently been observed to imitate one another and also human activities in the use of objects for varied purposes.

Hornaday's (1923, p. 236) observations seem to indicate that the activities of chimpanzees are somewhat different. In playing, the young seize each other and wrestle, fall, and roll over and over indefinitely. They make great pretenses at biting each other, but it is all "make believe." The chimpanzee by nature, according to Garner (1896, p. 237), is sociable and is fond of human society. He imitates the actions of man in many things, and quickly adapts himself to new conditions. He is very inquisitive but not as imitative as some monkeys.

Hornaday (1923, p. 237) describes a bright chimpanzee, named Baldy, who often hectored his female cage mate. What he did most frequently was to destroy her bed after she had laboriously carried straw up to the balcony and settled down upon it for a well-earned rest. Baldy was a born comedian. He executed a great trapeze performance of clownish and absurd gymnastics and his dancing always entertained the visitors to the cage.

Köhler (1931, pp. 9-10) discusses the jumping of a chimpanzee, Sultan, with the aid of a pole or stick. This action was invented by Sultan and imitated by Rana. The animals would place the long pole upright or at a slight angle on the ground and clamber up it very quickly. Then they would either fall with it in some direction or swing themselves off from it in the very



instant it fell. They could have "got there" much more easily by walking or climbing. Köhler concludes from the constant repetition of this performance, it was done out of the wish to "jump and leap per se," just as children walk on stilts "for fun!"

Straws and twigs, according to Köhler (1931, p. 75), were used in pure play during meal times, when the animals had free access to drinking water. When their first thirst had been quenched in great gulps, one of the animals would take a straw, dip it into the water and suck it.

Play, the Yerkes (1929, pp. 253-254) report, frequently takes the form of a fashion or mode, a fact which is especially noticed in the case of captive chimpanzees. Each day has its prevalent form of play or work, of social relation, or of animosity and petty quarrel. Forms of play are invented, followed intently for a time, and then abandoned. Although the isolated chimpanzee may be active, playful, inventive, endlessly investigative, and even contented and cheerful, play nevertheless is essentially a social phenomenon.

The Yerkes (1929, pp. 254 and 284) also state that conspicuous among the playful activities which repeatedly have been described are varied fooling with objects in the environment and endless manipulation thereof: chasing, tussling, romping, mock fighting; game-like behavior, including sly tricks, and surprises apparently perpetuated with mischievous intent; and finally, juvenile sexual play and practice. Inventiveness as well as imitativeness frequently are evident in playful behavior. If the young chimpanzee is well and vigorous, he is likely to be





full of energy, good-naturedly boisterous, and ready for social contacts.

The Yerkes (1929, p. 284) conclude from their observations that a change in temperament and effective expressions occurs in the chimpanzee between birth and senility. The ape's infancy is characterized by a marked degree of helplessness and demands for parental attention. During childhood, good-natured irresponsible playfulness, buoyancy, and restlessness are dominant. In adolescence, the attitude toward life rapidly becomes more serious, and there is a transformation of play into activities necessary to self-maintenance. What early in life was a buoyant and joyous creature later becomes an unsociable and morose one.



## CONCLUSION

Among play the writer has included those activities which are performed when the necessities of life have been obtained and those which are not essential for maintaining life itself. This activity is much more noticeable among the young of animals than among the adults, although in some cases one or both of the parents may play with their offspring. The probability that more time is spent in play during youth is very likely due to the fact that with the adult most of his time must be spent in sustaining life. The amount of time spent in play is greater in the higher animals than in the lower ones. This is probably related to the greater length of the youth of these animals and the need for the development of their faculties.

Various theories have been developed concerning the purpose and reason for play. Spencer (1888) and Schiller (1901) both believed play was due to surplus energy. The fact that a kitten will continue to play with a string long after it has become weary is one of the many examples which seem to disprove that this is the only reason for play.

Another theory is that play fits the animal for the activities of later life. Groos (1898) is a staunch supporter of this view. In youth the animal does things in play which in later life will be a serious business for it. The kitten playing with a ball is developing a skill which can be used in catching prey. This theory seems to be more plausible because of the great amount of play found among young animals. It certainly aids





them in gaining muscular coordination, strength, and experience.

Morgan (1900) and Köhler (1931) feel that play is to satisfy certain emotional conditions. The animal plays for the pure pleasure of being a part in the activity, for the pleasure of success which it feels, and to satisfy certain desires.

After studying these various theories, the writer feels that each one is at times a contributing factor and no one theory satisfies all conditions under which play occurs.

Groos (1898) has classified the various types of play into nine groups, namely: experimentation plays, movement plays, hunting plays, fighting plays, love plays, constructive arts, nursing plays, imitative plays, and curiosity. He considers love plays so important that he devotes a whole chapter in his treatise to these alone. He also points out the difficulty in being sure some antics of animals are really play.

Mayflies and midges have various types of flights which seem to be a form of play. Spiders display many strange antics during the time of mating.

Among the amphibians we find newts and salamanders engaged in playful performance, as shown by a noticeable display and odd gesticulations at mating time.

In the reptiles we find even the dull and apathetic crocodile executing most undignified caperings in the presence of his mate. Also the giant tortoise in "love-making" stalks about the female in a circle, frequently stopping in a position facing the side of her shell.





The birds give us considerable material. Some birds are engaged in sheer movements of flight and antics for the joy of it. During the mating season there are many interesting antics, as display, dancing, and the use of song.

Mammals give us many good examples. The greatest amount of play is found among the young.

Squirrels seem to revel in racing and chasing to and fro over the trees and then, for a time, stop simply to chatter and scold just for the fun of making a noise.

Antelopes and elks seem to enjoy capering and prancing about while the otters have their fun sliding down slopes and landing in water. But, of all the animals, the bears seem to be most playful, continuing to enjoy wrestling, boxing, teasing, and "skylarking" even until they are quite old.

The play of apes is well known to all who have visited the zoo. There has been some experimenting with these animals, but Yerkes feels there is need for much more scientific research. Most of the observations have been made on animals in captivity and comparatively few on animals in their natural environment.

As in the case of the other animals, there is much more playfulness among the young than among the older apes. This is probably due to the fact that many of the older apes have become too heavy to play easily.

Of the anthropoid apes, the chimpanzee is the most playful. In the order of their playfulness they are gibbon, gorilla, orang-utan, and chimpanzee.



Although much has been learned from the study of animal play, the observations already made point to a field in which much more experimenting should be done. Because of the great importance which has been attached to the play of animals as a training for later life, the writer feels that great benefits may be derived from further study of this interesting phase of animal life.





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